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	<i>DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI; PLUR=YES; OP=ADJ</i>		
<input type="checkbox"/>	L6	L5 and apoe4 and transgenic	42
<input type="checkbox"/>	L5	435/455,463,320.1,325.ccls.	35986
<input type="checkbox"/>	L4	L3 and apoe4	13
<input type="checkbox"/>	L3	800/18,3,9,13,13,21,22.ccls.	1798
<input type="checkbox"/>	L2	apoe4 with transgenic	40
<input type="checkbox"/>	L1	apoe4 near transgenic	8

END OF SEARCH HISTORY

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FILE 'CAPLUS, MEDLINE, EMBASE, BIOSIS, LIFESCI' ENTERED AT 16:24:36 ON 09 NOV 2005

L1	85 S APOE4 WITH TRANSGENIC
L2	11 S L1 AND (THR OR ARG OR THREONINE OR ARGININE)
L3	4 DUP REM L2 (7 DUPLICATES REMOVED)
L4	4 S L1 AND 61
L5	1 DUP REM L4 (3 DUPLICATES REMOVED)
L6	78 S L1 AND HUMAN
L7	31 S L6 AND PY<=2001
L8	14 DUP REM L7 (17 DUPLICATES REMOVED)
L9	938 S WEISGRABER K?/AU
L10	11 S L1 AND L2
L11	0 S L9 AND L1
L12	205 S L9 AND APOE4
L13	12 S L12 AND TRANSGEN?
L14	4 DUP REM L13 (8 DUPLICATES REMOVED)
L15	1217 S FARESE R?/AU
L16	8 S L15 AND APOE4
L17	4 DUP REM L16 (4 DUPLICATES REMOVED)
L18	39 S RAFFAI RO?/AU
L19	13 S L18 AND APOE4
L20	6 DUP REM L19 (7 DUPLICATES REMOVED)
L21	1900 S DONG LI?/AU
L22	21 S L21 AND APOE4
L23	10 DUP REM L22 (11 DUPLICATES REMOVED)

1: Apoe apolipoprotein E [*Mus musculus*]

GeneID: 11816 Locus tag: MGI:88057

updated 06-Nov-2005

Summary

Official Symbol: Apoe and **Name:** apolipoprotein E provided by Mouse Genome Informatics

Gene type: protein coding

Gene name: Apoe

Gene description: apolipoprotein E

RefSeq status: Provisional

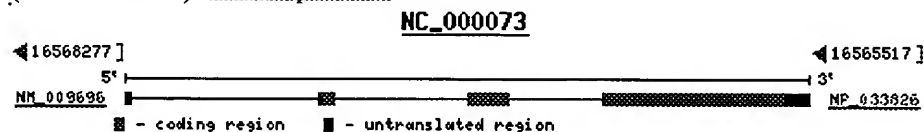
Organism: *Mus musculus*

Lineage: *Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Euteleostomi; Mammalia; Eutheria; Euarchontoglires; Glires; Rodentia; Sciurognathi; Muroidea; Muridae; Murinae; Mus*

Gene aliases: AI255918

Genomic regions, transcripts, and products

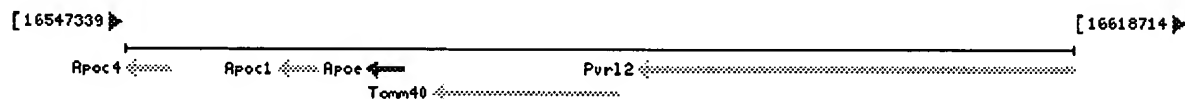
(minus strand) RefSeq below



Genomic context

See Apoc in MapViewer

chromosome: 7; Locations: 7 A2; 7 4.0 cM



Bibliography

Gene References into Function (GeneRIF): **Submit**

PubMed links

GeneRIFs:

1. Scarb1/apoE knockout mice have coronary heart disease not involving lymphocytes [PubMed](#)
2. ApoE mediates the presentation of serum-borne lipid antigens and can be secreted by antigen presenting cells as a mechanism to survey the local environment to capture antigens or to transfer microbial lipids from infected cells to bystander APCs [PubMed](#)

Entrez Gene

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- Summary
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[Taxonomy](#)
[UniSTS](#)
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[Evidence Viewer](#)
[Gene Expression Data](#)
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[MGC](#)
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3. ApoE4 mice develop a constellation of changes that mimic the pathology associated with human age-related macular degeneration [PubMed](#)
4. protein engineering studies show that a destabilized conformation promotes apoE4 lipid binding [PubMed](#)
5. additive effects of apoE and clusterin on influencing amyloid-beta deposition [PubMed](#)
6. A cholesterol-independent role of apolipoprotein E in atherosclerosis regression is critical for lipid removal from the fibrotic component of the plaque but not from the foam cell-rich layer beneath the endothelium. [PubMed](#)
7. Human CRP transgene expression is thus up-regulated in apoE-deficient mice, apparently reflecting altered estrogen levels, despite the absence of other systemic signs of inflammation [PubMed](#)
8. In addition to the effect of apoE on lipid trafficking, apoE may also influence the astroglial response to damage [PubMed](#)
9. Chronic renal failure aggravates atherosclerosis in apoE(-/-) mice. [PubMed](#)
10. ApoE has a physiologic role as a regulator of osteoblast function [PubMed](#)
11. Effects of a standardized freeze-dried powder made from fresh grapes on the development of atherosclerotic lesions in apolipoprotein E deficient mice. [PubMed](#)
12. Increased atherosclerosis is accompanied by increases in VCAM-1 and P-selectin levels in the two apoE(-/-) mouse strains, the high HDL level may protect against atherosclerosis by inhibiting the expression of adhesion molecules in BALB/c.apoE(-/-) mice. [PubMed](#)
13. autoregulation of the LXRA gene facilitates induction of apoE in mouse adipose tissue [PubMed](#)
14. important in HSV-1 colonization of ovaries [PubMed](#)
15. In a mouse model of restenosis, a subphysiological level of apoE was associated with beneficial effects on lesion size/composition. ApoE has a generally important protective function in the arterial wall. [PubMed](#)
16. Results indicate that adipose tissue expression of apolipoprotein E is modulated by physiologic regulators of insulin sensitivity. [PubMed](#)
17. Improvement in insulin resistance induced by a high-fat diet, in apoe knockout mice of vasculopathy. did not alter plaque composition, [PubMed](#)
18. activation of extracellular signal-regulated kinase has a role in increasing tau phosphorylation in apolipoprotein E4 transgenic mice [PubMed](#)
19. Deficiency of apoE protein in macrophages attenuates the ingestion of apoptotic cells in vitro and results in impaired clearance of apoptotic cell remnants and a functionally relevant systemic proinflammatory condition in vivo. [PubMed](#)
20. Intravital microscopy of the common carotid artery revealed a significantly greater number of leukocytes rolling on the vessel walls in apoE-/-pGI receptor-/- mice. [PubMed](#)
21. The apoE4 isoform of apolipoprotein E (apoE), which is the major genetic risk factor of Alzheimer disease. [PubMed](#)
22. plays a significant role in host defense against candidiasis. [PubMed](#)
23. Review. This review will examine our present understanding of the pathology and progression of plaques in Apo-E-deficient mice and highlight some of the nutritional, pharmacological, and genetic studies that have enhanced this understanding. [PubMed](#)
24. ApoE3 has a role in liver expression of fatty acid binding protein, as shown in transgenic mice models [PubMed](#)
25. apoE metabolism requires ABCA1 protein in the central nervous system [PubMed](#)
26. Results describe the relative roles of apolipoprotein E isoforms in low density lipoprotein receptor (LDLR)- and non-LDLR-mediated very low density lipoprotein (VLDL) clearance. [PubMed](#)
27. The accelerated renal injury that was observed in diabetic apo E-KO mice was attenuated by approaches that inhibit renal AGE accumulation. [PubMed](#)

28. serum chemokine levels are potential markers for atherosclerosis susceptibility in C3H and C57BL apoE(-/-) mice fed on a normal rodent diet [PubMed](#)
29. uremia markedly accelerates atherogenesis in apolipoprotein E-deficient mice. [PubMed](#)
30. Results show that alterations in DNA methylation profiles are early markers of atherosclerosis in an apolipoprotein E-null mouse model and may play a causative role in atherogenesis. [PubMed](#)
31. Knockout mice are at risk for cognitive deficits. [PubMed](#)
32. Apolipoprotein E promotes astrocyte colocalization and degradation of deposited amyloid-beta peptides. [PubMed](#)
33. After sirolimus treatment, the cholesterol content of the aortic arch was reduced in apoE knockout mice compared to normal controls. [PubMed](#)
34. estradiol facilitates neurite growth through an ApoE-dependent mechanism. [PubMed](#)
35. Low plasma apoE (1-3 x 10⁻⁸ M) suppresses atherosclerosis by as yet undefined mechanisms, not dependent on the presence of apoA-I or HDL or an increased capacity of serum acceptors for Free Cholesterol efflux [PubMed](#)
36. ApoE deficient mice had significantly increased lymphocyte proliferation responses to both myelin antigens and mitogens and significantly more infiltrating lesions in the central nervous system (CNS) in histopathology [PubMed](#)
37. generation and characterization of two transgenic mouse lines expressing human ApoE2 in neurons and glial cells [PubMed](#)
38. use of a model of conditional gene repair to examine metabolism [PubMed](#)
39. Conditional disruption of the peroxisome proliferator-activated receptor gamma gene in mice results in lowered expression of ABCA1, ABCG1, and apoE in macrophages and reduced cholesterol efflux. [PubMed](#)
40. modulating transport of polyunsaturated phospholipid molecular species in synaptic plasma membranes. [PubMed](#)
41. Results identify the cyclooxygenase-2 gene as a target of APOE signaling, link HDL and APOE to prostacyclin receptor IP action, and describe a potential new basis for the cardioprotective effect of HDL and APOE. [PubMed](#)
42. ApoE normally associates with acetylcholinesterase in the synaptic cleft of slow muscles, modulating the activity of the enzyme and therefore quantal size. [PubMed](#)
43. neuronal expression of apoE is regulated by a diffusible factor or factors released from astrocytes [PubMed](#)
44. impact of telomere attrition on atherogenesis induced by dietary cholesterol in apolipoprotein E (apoE)-deficient mice [PubMed](#)
45. In aged female apoE0/0 mice water maze performance was impaired with search strategies. In parallel, increased corticosterone concentrations were measured in apoE0/0 mice in response to novelty and during the circadian cycle. [PubMed](#)
46. Lack of both NPRA and apoE synergistically enhances cardiac hypertrophy, suggesting roles for Npr1 as well as Apoe in regulation of hypertrophic cell growth. [PubMed](#)
47. Results demonstrate that apoE4-202 functions even in the presence of clearance-defective apoE2. [PubMed](#)
48. isoform-specific role in mediating the systemic and brain inflammatory responses [PubMed](#)
49. TR4 can also regulate apolipoprotein E, C-I, and C-II gene expression via the TR4 response element within the hepatic control region [PubMed](#)
50. Brain regional differences in the production of apoE throughout the estrous cycle were noted. Exogenous estradiol has regionally specific effects on apoE expression. Regional variability appears to vary as a function of the estrogen receptor subtype [PubMed](#)
51. role in Alzheimer's disease-like neurodegeneration and behavioral deficits in transgenic mice [PubMed](#)
52. apoE inhibits cell migration via cAMP-dependent protein kinase A activation as a consequence of its binding to LRP-1 [PubMed](#)

53. After adoptive regulatory T cells type 1 transfer in female apolipoprotein E-knockout mice, developing atherosclerotic plaques had fewer macrophages and T cells than plaques of control mice [PubMed](#)
54. apoE deficiency in apoE knockout mice leads to a deficit in olfactory function, suggesting an important role for apoE in the olfactory system [PubMed](#)
55. ApoE(-)/IL-4(-) mice showed a 58% and 64% decrease in disease in aortic arch compared to apoE(-) and apoE(-)/IL-12(-) mice, respectively, and a 78% decrease in thoracic lesions compared to apoE(-)/IL-12(-). [PubMed](#)
56. Apolipoprotein E facilitates cerebral amyloid angiopathy and spontaneous hemorrhage in amyloid precursor protein transgenic mice. [PubMed](#)
57. ApoB-48 and apoB-100 differentially influence the expression of type-III hyperlipoproteinemia in APOE*2 mice [PubMed](#)
58. adrenal gland cholesterol metabolism in apolipoprotein E deficient mice [PubMed](#)
59. lack of lipoprotein receptor-related protein 5 and apolipoprotein E is seen in severe hypercholesterolemia, impaired fat tolerance, and advanced atherosclerosis [PubMed](#)
60. recycling of apolipoprotein E in primary cultures of mouse hepatocytes [PubMed](#)
61. Following complete spinal cord transection Apo-E is upregulated in neutrophils and macrophages at the injury site and is found at later times in astrocytes during remodeling of white matter tracts, notably in degenerating parts of the fasciculus gracilis. [PubMed](#)
62. Apolipoprotein E deficiency promotes increased oxidative stress and compensatory increases in antioxidants in brain tissue. [PubMed](#)
63. The increase in apoE expression closely correlated in time and spatial distribution with axonal and neuronal degeneration, consistent with a role as an 'injury-response' protein. [PubMed](#)
64. Transgenic mice deficient in apoE display altered levels of mature amyloid precursor protein (APP) as well as increased amounts of both beta-cleaved C-terminal fragments and Abeta peptides. [PubMed](#)
65. Mice lacking apoE appear not to be impaired in spatial memory per se but are deficient in a procedural component of the Morris water maze. [PubMed](#)
66. The effect of angiotensin II on arterial wall stiffness in apolipoprotein E knockout mice. [PubMed](#)
67. involvement of ApoE in the hematogenous route of HSV-1 to the CNS [PubMed](#)
68. Peroxisome proliferator-activated receptor alpha,gamma coagonist LY465608 inhibits macrophage activation and atherosclerosis in apolipoprotein E knockout mice [PubMed](#)
69. in null mice, blockade of platelet-derived growth factor or its receptors transiently delays but does not prevent fibrous cap formation [PubMed](#)
70. The data indicate a neuroprotective role for estrogen in global ischemia, the mechanism of which is apoE-dependent [PubMed](#)
71. regulated expression of gene cluster in macrophages [PubMed](#)
72. regulation of macrophage ApoE expression and processing by extracellular matrix [PubMed](#)
73. helps maintain blood brain barrier; of particular importance after brain injury [PubMed](#)
74. Apolipoprotein E4 potentiates amyloid beta peptide-induced lysosomal leakage and apoptosis in neuronal cells [PubMed](#)
75. Reconstituted discoidal ApoE-phospholipid particles are ligands for the scavenger receptor BI [PubMed](#)
76. ApoE affects the age of onset of Abeta deposition in amyloid precursor protein transgenic mice as well as the level, structure and anatomic distribution of brain Abeta deposits. [PubMed](#)
77. Apo-E knockout middle cerebral artery occlusion mice showed a worsened deficit in locomotor activity, which was significantly correlated with exacerbated cortical lesion volume [PubMed](#)

Alleles

? 1

The following allele types are documented at Mouse Genome Informatics ([MGI](#))

- Targeted (knock-in) (1) [PubMed](#)
- Targeted (knock-out) (3) [PubMed](#)

General gene information

? 1

Markers

Apoe(e-PCR) (Links: [UniSTS: 141112](#))

Alternate name: MGI:1205863

AI255918(e-PCR) (Links: [UniSTS: 179533](#))

Alternate name: 392587

PMC186328P2(e-PCR) (Links: [UniSTS: 271700](#))

GeneOntology

Provided by [MGI](#)

Function

[heparin binding](#)

[lipid binding](#)

[lipid transporter activity](#)

[lipoprotein binding](#)

Evidence

IEA

IEA

IEA

IDA [PubMed](#)

Process

[cholesterol homeostasis](#)

[cholesterol metabolism](#)

[lipid transport](#)

[lipoprotein metabolism](#)

[response to oxidative stress](#)

[transport](#)

IMP [PubMed](#)

IMP [PubMed](#)

IEA

IEA

IMP [PubMed](#)

IEA

Component

[chylomicron](#)

[extracellular region](#)

[extracellular space](#)

IEA

IEA

RCA [PubMed](#)

Homology:

Human, Rat

[Map Viewer](#)

Pathways

KEGG pathway: Alzheimer's disease [05010](#)

KEGG pathway: Neurodegenerative Disorders [01510](#)

General protein information

? 1

Name: apolipoprotein E

NCBI Reference Sequences (RefSeq)

? 1

mRNA Sequence [NM_009696](#)

Source Sequence [BC028816](#)

Product [NP_033826](#) apolipoprotein E

Conserved Domains (1) [summary](#)

[pfam01442](#): Apolipoprotein; Apolipoprotein A1/A4/E family

Related Sequences



Nucleotide	Protein	Strain
Genomic D00466	BAA00361	BALB/c
mRNA AK010261	None	C57BL/6J
mRNA AK019319	None	C57BL/6J
mRNA AK075843	BAC36000	C57BL/6J
mRNA AK131624	None	C57BL/6J
mRNA AK134921	BAE22338	C57BL/6J
mRNA AK148747	None	C57BL/6J
mRNA AK149111	BAE28740	C57BL/6J
mRNA AK149568	BAE28964	C57BL/6J
mRNA AK150834	BAE29894	C57BL/6J
mRNA AK159105	BAE34821	C57BL/6J
mRNA AK159424	BAE35071	C57BL/6J
mRNA AK159517	BAE35147	C57BL/6J
mRNA BC028816	AAH28816	FVB/N
mRNA BC044785	None	FVB/N
mRNA BC083351	AAH83351	C57BL/6
mRNA CT010212	CAJ18420	
mRNA CT010356	CAJ18564	
mRNA M12414	AAA37251	
mRNA M73490	AAA37252	C57BL/6J
None	P08226	

Additional Links

UniGene [Mm.305152](#)Gene Expression Database (GXD) at MGI [MGI:88057](#)Display ☒ Full Report ☒ Show ☒ Send to

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Other Genome Feature Detail

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Symbol Name ID	Tg(GFAP-APOE4) 1Hol transgene insertion 1, David M Holtzman MGI:3057183	Nomenclature History
Genetic Map	Chromosome Unknown	
Phenotypes	All phenotypic alleles(1) : Transgenic(1)	
References	J:93487 Sun Y <i>et al.</i> , "Glial fibrillary acidic protein-apolipoprotein E (apoE) transgenic mice: astrocyte-specific expression and differing biological effects of astrocyte-secreted apoE3 and apoE4 lipoproteins." J Neurosci 1998 May 1;18(9):3261-72 All references(1)	

last database update
11/07/2005
MGI 3.4